

CDC/ATSDR Information Technology Architecture Executive Summary

September 2000

Introduction

The mission of the Centers for Disease Control and Prevention (CDC) and Agency for Toxic Substances and Disease Registry (ATSDR) ¹ is to promote health and quality of life by preventing and controlling disease, injury, and disability. In carrying out that mission, data and information are the fundamental building blocks that enable scientific discovery and public health actions. Consequently, information technology is critically important for the attainment, management, use, and communication of public health related data and information.

An enterprise-wide Information Technology Architecture (ITA) is essential to establish an agency vision for next generation systems that integrate with the agency's mission, business directions and needs. It ensures systems and services achieve high reliability, security, availability, performance, and interoperability. It focuses capital investments and research projects in alignment with the desired architecture and system goals.

The development and refinement of CDC's ITA (ref: <http://www.cdc.gov/irmo/ita/>) is a continuous process involving CDC's Centers, Institute, and Program Offices (CIOs). CIO representatives form an IT Architecture Work Group (ITAWG) for the development and refinement of the ITA.

ITA Content

The CDC Information Technology Architecture (ITA) describes the relationships among the work the agency does, the information the agency uses, and the information technology that the agency needs. CDC's ITA includes the following three components:

- 1. Enterprise Architecture** is the explicit description of the current and desired relationships among business and management processes and information technology. The Enterprise Architecture consists of:
 - Business Processes
 - Information Flows and Relationships
 - Applications
 - Data Descriptions
 - Technology Infrastructure
- 2. Technical Reference Model & Standards Profiles** address the cross-cutting technical foundations of the ITA to ensure security, interoperability, portability, and scalability in systems throughout the agency.

¹ References to CDC include ATSDR

3. **Implementation Plans and Maintenance Processes** are developed to ensure the ITA is put into practice on a regular and ongoing basis and address change management, legacy systems integration, IT personnel planning, and a certification/waiver process to address rational exceptions.

Approach

There are five core tasks comprising ITA development for the CDC:

- **Enterprise Mission Context And Direction** – aligns the ITA with the agency mission, strategic and performance plan, and external considerations.
- **As-Is Infrastructure Analysis** – documents the business processes, systems, and technical infrastructure that are in place currently to ensure a common understanding of the existing state.
- **Target Enterprise Architecture** – establishes the information and IT architecture necessary to achieve the information goals of the agency.
- **Governance and Management** – provides processes for the development, evaluation, oversight, and adoption of ITA and related policies, standards, and decisions.
- **Transition strategies** provide the roadmap to get CDC from its current state to the target enterprise architecture.

ITA Status

The table below outlines the major tasks and the status of each.

	Approach	Completed	In Process	Remaining Work
1	Capture Enterprise Mission Context and Direction	<ul style="list-style-type: none"> Common Requirements Vision Document - draft CDC-wide Functions and Definitions – draft 	<ul style="list-style-type: none"> Review of drafts 	<ul style="list-style-type: none"> Update deliverables as necessary
2	Document Current Enterprise Architecture	<ul style="list-style-type: none"> Network Technical Ref Model Security & critical infrastructure protection Resource Mgmt 	<ul style="list-style-type: none"> Working with CIOs to capture current state 	<ul style="list-style-type: none"> Complete 1st iteration Current State for all CIOs Update Current State as necessary
3	Develop CDC Target Enterprise Architecture, Technical Reference Model, Standards	<ul style="list-style-type: none"> National Electronic Disease Surveillance Systems (NEDSS) – Common Information for Public Health Electronic Reporting (CIPHER), User Interface Guide, Public Health Conceptual Data Model (PHCDM), Secure Data Network (SDN) Health Alert Network (HAN) Network Security Resource Mgmt Critical Infrastructure Protection 	<ul style="list-style-type: none"> E-Commerce E-Government 	<ul style="list-style-type: none"> Develop Conceptual Target Architecture in all areas Develop Functional Architectures
4	Develop ITA Governance and Management	<ul style="list-style-type: none"> Governance process – draft 	<ul style="list-style-type: none"> Under revision based on review and comments HR Model for IT & informatics professionals 	<ul style="list-style-type: none"> Establish Change Mgmt process
5	Develop Transition Strategies	<ul style="list-style-type: none"> Network HAN NEDSS 	<ul style="list-style-type: none"> NEDSS SDN 	<ul style="list-style-type: none"> Develop transition strategies for other areas of ITA Develop Migration Plans

ITA Components Completed

Currently, the following components of CDC's ITA are completed and are briefly described in the sections which follow:

- Common Requirements Vision
- Functional Analysis
- Network Architecture
- Health Alert Network
- National Electronic Disease Surveillance System
- Information Security and Critical Infrastructure Protection
- Human Resources Enterprise Resources Planning (ERP)

Common Requirements Vision

The Common Requirements Vision document identifies influencing environmental trends and the impact they have on the key driving business strategies of the enterprise. This document also identifies the information required by the business decision makers to satisfy the enterprise business strategies, and translates the business information requirements into requirements for CDC's Information Technology Architecture.

Agency Functional Analysis

The CDC wide functions analysis (ref: <http://www.cdc.gov/irmo/ita/functions.htm>) has yielded six major functions and 28 major sub-functions summarized in the table below:

Major Functions	Major Sub-functions
Public Health Monitoring	Public Health Surveillance, Health Determinants, Epidemiological Analysis, Vital Statistics, Health Surveys
Research	Laboratory, Epidemiologic, Prevention, Survey and Statistical Methods, Health Effects
Public Health Communications	Health Alerts, Promotion of Preventive Practices
Public Health Services	Emergency Response, Technical Assistance & Consultation, Outbreak Investigation and Intervention, Diagnostic Lab Testing and Quality Assurance, Program Implementation, Program Evaluations, Public Health Worker Training and Education, Development of Regulations, Standards, Policies, and Guidelines, Infrastructure Assessment and Development
Strategic Planning	
Resource Management	Grants, Human Resources, Information, Facilities, Financial, Materiel

Network Architecture

CDC has been on the forefront of distributed computing and networking since the early 1980's. Over that period, the network has continually evolved to stay abreast of new technologies, broaden the services available, enable remote access from anywhere, and ensure reliability, security, and high performance. The table which follows depicts the most current architectural transition (ref: <http://www.cdc.gov/irmo/ita/library.htm>).

Network Component	Current Architecture	Next Generation Architecture	Transition Period
LAN Topology	16Mbps Token Ring	100 Mbps Fast Ethernet	In progress
Protocol	IPX & TCPIP	TCPIP	In progress
Atlanta Metropolitan Area Network	100 Mbps FDDI ring and several T1 & fractional T1 to smaller campuses	OC3 to OC 48 SONET ATM backbone	Jul 00 – Jul 01
Wide Area Network	T1s and fractional T1s to non-Atlanta sites	ATM across multiple T1s as needed	Jul 00 – Jul 01
Transport Services	Voice, data, & video on separate networks	Converged voice, data, & video over the ATM backbone	Jul 00 – Jul 01
Telephony	Local service provided by RBOC, voice mail provided by service bureau	Digital PBX with integrated voice mail	Jul 00 – Jul 01
Internet	T3 & 10 Mbps back-up ISP connection	Dual T3s with load balancing and automatic failover	As needed

Health Alert Network

As part of the initiative to improve the Nation's public health infrastructure particularly in arena of bioterrorism preparedness and response, a health alert network (HAN) is under development (ref: <http://www.phppo.cdc.gov/han/index.asp>). Essentially, HAN builds IT capacity at local health departments nationally so that potential public health emergencies can be better prevented, detected, communicated, and responded to through public health surveillance, training, data communications, analysis, and information dissemination. Architectural standards have been established for HAN to ensure that all state and local health departments participating in HAN through CDC financial assistance programs will be able to interoperate, communicate, and share data in a high performance, secure and standardized manner.

National Electronic Disease Surveillance System

To better manage and enhance the large number of current surveillance systems and allow the public health community to respond more quickly to public health threats (e.g., outbreaks of emerging infectious diseases, bioterrorism, etc.), CDC is implementing the National Electronic Disease Surveillance System (NEDSS). When completed, NEDSS will electronically integrate and link together a wide variety of surveillance activities and will facilitate more accurate and timely reporting of disease information to CDC and state and local health departments. NEDSS will include data standards, an Internet-based communications infrastructure built on industry standards (ref: http://www.cdc.gov/od/hissb/act_int.htm), and policy-level agreements on data access, sharing, burden reduction, and protection of confidentiality. NEDSS architectural standards have been developed and communicated to states along with financial assistance to foster intergovernmental interoperability of public health surveillance data in these next generation Internet-based systems.

Information Security and Critical Infrastructure Protection

In accordance with several federal laws, policies, and Presidential Decision Directive 63 (PDD-63), CDC has a comprehensive information security and critical infrastructure protection program in place (ref: <http://intranet.cdc.gov/irmo/irmointra/security.htm>

Note: This is an internal CDC link only). This program covers physical security, personnel security, as well as cyber security. The cyber security component of the program covers:

- Policies
- Organizational Responsibilities and Staffing
- Incident Response
- Access Controls
 - Passcodes
 - Digital Certificates
 - User Account Administration
 - Workflow Systems
- Encryption
- Internet Firewall
- Extranets and Virtual Private Networks (VPN)
 - Secure Data Network (SDN)
 - Other Secure Internet Transactions
 - Extended Networking
- Virus Protection
- Contingency Planning and Disaster Recovery
- Continuation of Operations Planning
- Security Monitoring and Evaluation
 - Intrusion Detection Monitoring
 - Audits
 - Penetration Testing
 - Exercises

Enterprise Human Resources Planning (EHRP)

CDC has enjoyed an integrated suite of administrative business systems with a common workflow presentation for many years. In keeping with the integration model that CDC has adopted, the next generation of human resources management systems will look to leverage the integration and interoperability features of commercially developed EHRP systems. The future CDC core human resources system functionality will be provided by the Peoplesoft EHRP which has been federalized and developed using current technology and 'best practices' in human resources management. This EHRP implementation will provide the base on which other peripheral functionality such as training, performance appraisals and workforce planning can be built. This extended functionality can be provided through the addition of commercially supplied modules which are fully integrated with the core human resources capabilities. This direction, while providing a highly integrated architecture for human resources management capabilities, is firmly in line with the Clinger-Cohen Act that encourages the use of commercially developed systems when possible.

Summary

Much work has been performed by many diverse CDC groups to begin developing components of CDC's Information Technology Architecture (ITA) – and the work continues. The CDC ITA continues to evolve toward a mature articulation of the agency's mission and business directions and the proper alignment of information

technology needed to support that mission. As the ITA matures, additional opportunities to improve the reliability, security, availability, performance, and interoperability of CDC systems and services can be realized.